AMENDED CLAIMS

[received by the International Bureau 23 December 2004 (23.12.04); original claim 5 amended; claims 12 to 33 replaced by new claims 12 to 43 (10 pages)]

3. The method as recited in claim 1 or 2, wherein said guide means comprises a set of roller guides secured to the master core plate and rollingly engaging said first core plate, said guide means following a guide path perpendicular to the motion of the mold machine, facilitating removal of said mold module from said mold machine.

4. The method as recited in claim 3 wherein said roller guides guide the core plate relative to said master core plate along a countoured slot defined in the master core plate, said slot being shaped to allow core plate to move vertically and parallel to master core plate for an initial period thereby causing disengagement of quick disconnect couplings between plates, then shaped to allow the core plate (and attached module) to move slightly away from the master core plate so that the mold module may be then be rapidly hoisted out of the mold machine.

5. The method as recited in claim 2 further comprising the step of applying an hoist attachment member simultaneously to the periphery of each said module when in closed position, said modules being slidably engaged to said hoist attachment, slidable in the direction of opening and closing the mold machine, such that when said modules are attached to the hoist attachment, they may be moved to the open position to allow said separation of cavity plates from said manifold plates and disengagement of quick disconnect couplings between plates, and once said modules are so separated and couplings disengaged, hoisting said hoist attachment.

6. The method as recited in claim 5 wherein said hoist attachment further includes a stop at opposite ends thereof, which limits the sliding movement of each block beyond the point where said cavity plates and components thereof are separated from said manifold plate and accommodates replacement modules with the same dimensions.

(b) securing said core plate to said cavity plate, thereby forming a mold module;

(c) releasing the securing means which secures the core plate to the manifold plate;

(d) opening the mold from the closed position, until the first core plate disengages the manifold plate and all connections thereto,

(e) releasing the securing means which secures the cavity plate to the master core plate;

(f) lifting said mold module in a direction perpendicular to the direction of motion between said open and closed position, said module being guided in in said perpendicular direction by said guide means.

12. The method as recited in claim 11 further comprising the step of applying an hoist attachment member simultaneously to the periphery of each said module when in closed position, said modules being slidably engaged to said hoist attachment, slidable in the direction of opening and closing the mold machine, such that when said modules are attached to the hoist attachment, they may be moved to the open position to allow said separation of core plates from said manifold plates and disengagement of quick disconnect couplings between plates, and once said modules are so separated and couplings disengaged, hoisting said hoist attachment.

13. A hoist bar, comprising a main bar having an upper side and a lower side, and a pair of blocks secured to the lower side of said bar at opposite ends thereof, each block having an opening parallel to the length of the bar, said bar having at least one hoist member secured to the upper side of the bar, said hoist member adapted for lifting said bar, a guide pin extending through the opening in each said block, said guide pins having mounting blocks at the end of each guide pin, which limit the sliding movement of the guide pins within each opening, each said mounting block being adapted to mount a mold plate, thereby when said mounting

blocks are mounted to said plates, said plates may slide relative to the main bar, and said hoist bar may be lifted when said mounted mold plates have slid into a selectable relative sliding position on the lift bar.

14. A hoist bar comprising a main bar having an upper side and a lower side, and a pair of blocks secured to the lower side of said bar at opposite ends thereof, each block having an opening parallel to the length of the bar, said bar having at least one hoist member secured to the upper side of the bar, said hoist member adapted for lifting said bar, a guide pin extending through the opening in each said block, said guide pins having mounting blocks at the end of each guide pin, which limit the sliding movement of the guide pins within each opening, each said mounting block being adapted to mount a mold plate, thereby when said mounting blocks are mounted to said plates, said plates may slide relative to the main bar, and said hoist bar may be lifted when said mounted mold plates have slid into a selectable relative sliding position on the lift, the hoist bar being used in the method of claim 3 such that one mounting block on each pin is secured to the core plate of a module and the other mounting block is secured to the cavity plate of the same module.

15. The method as recited in claim 1, 2 or 11 wherein a mold support apparatus supports the mold plates within said mold machine, said apparatus comprising mold support pieces interconnecting said plates to said machine, each said support piece engaged to one said plate and the tie bars or guide ways of said machine, each said support pieces positionable between an operable position wherein each interconnects said plate to said tie bars or guide ways and an inoperable position, wherein said support piece nests within said mold plate.

16. An apparatus for removing components of an injection mold machine, said machine comprising the following components: a core assembly including a master core plate, a core plate releasably secured to said master core plate, said master

core plate including guide means for guiding said core plate for movement relative to said master core plate; said core plate including a core insert secured to said core plate, the core insert having a front face;

a cavity assembly comprising a manifold plate, a first cavity plate releasably secured to the manifold plate, said first cavity plate oriented in the opposing direction to the core plate, a cavity insert attached to the cavity plate, said cavity assembly moveable relative to the core assembly between open and closed positions such that in the closed position, the cavity insert and core insert may be selectively mated together to define a cavity therebetween into which molten plastic may be injected from a molten plastic source, said cavity forming a shape of a desired article in said closed position, the core plate may be secured to said cavity plate to form a mold module, whereby when said cavity plate is released from securement to the manifold plate and all connections therebetween are disengaged, and the core plate is released from securement to the master core plate and all connections therebetween are disengaged, the mold module may be lifted in a direction perpendicular to the direction of motion between said open and closed position, said module being guided in said perpendicular direction by said guide means.

17. An apparatus for removing components of a stack injection mold machine, comprising: a stationary core assembly and an opposing facing moving core assembly each core assembly including a master core plate, and a core plate releasably secured to the master core plate, said core plate having a face, a first core insert secured to said core plate face, an intermediate cavity assembly comprising central manifold plates having opposing sides, one side facing the stationary core assembly the other side facing the moving core assembly, one cavity plate releasably secured to each said opposing side of the manifold plates, each cavity plate having a cavity insert secured thereto, one cavity plate and insert facing the core plate and insert of stationary core assembly to form one cavity core insert pair, and the other cavity plate and insert facing the core plate

and core insert of the moving core assembly to form another cavity core insert pair, said cavity assembly and moving core assembly movable by moving mold press means in such a manner that the cavity and core insert of each pair are separated by equal amounts on either side of the cavity assembly, and in a closed position, the cavity and core inserts of each pair are be mated together simultaneously defining a cavity between the inserts of each pair, into which molten plastic may be injected from a molten plastic source, said cavities forming the shape of a desired article, and in said closed position, the core plate and cavity plate of each pair may be secured together to form respective mold modules each comprised of a core plate, core inserts, cavity insert and cavity plate; once said cavity plates are released from securement to the manifold plates and all connections therebetween disengaged, the moving core assembly and cavity assembly may be moved from the closed position to an open position where said cavity plates become separated from said manifold plates; and once said core plates are released from securement to said respective master core plates and all connections therebetween are disengaged, said first and second mold modules may be simultaneously hoisted outwardly in a direction perpendicular to the direction of motion between said open and closed position, said modules being guided in said perpendicular direction by guiding means which guides said core plates perpendicularly along said master core plates.

18. The apparatus as recited in claim 16 or 17, wherein said guide means comprises a set of roller guides secured to the master core plate and rollingly engaging said first core plate, said guide means forming a guide path perpendicular to the motion of the mold machine, facilitating removal of each said mold module from said mold machine.

19. The apparatus as recited in claim 18 wherein said roller guides guide the core plate relative to said master core plate along a countoured slot defined in the master core plate, said slot being shaped to allow core plate to move vertically and

parallel to master core plate for an initial distance thereby causing disengagement of quick disconnect couplings between plates, then spaced away from the master core plate for a further distance so as to accommodate the mold module from being rapidly hoisted out of the mold machine.

20. The apparatus as recited in claims 16 to 19 wherein the position of said cavity plates and core plates are interchanged.

21. The apparatus as recited in claim 17 further comprising a hoist attachment member secured simultaneously to the periphery of each said module when in said closed position, said modules being slidably engaged to said hoist attachment, slidable in the direction of opening and closing the mold machine, such that when said modules are attached to the hoist attachment, each said module may be moved to the open position from said closed position to allow said separation of the cavity plates of each module from the manifold plates, and once said cavity plates are so separated, and said core plates released from securement to said master core plates, said mold modules may be hoisted out of said mold machine.

22. The apparatus as recited in claim 21 wherein said hoist attachment further includes a stop at opposite ends thereof, which limits the sliding movement of each block beyond the point where said cavity plates and components thereof are separated from said manifold plate.

23. The apparatus as recited in any one of claims 16 to 22 wherein said machine further comprises an ejector plate operable to assist in ejection of the molded article from within said cavity, said ejector plate defining a slot therethrough extending from a central portion of said plate to a peripheral portion of the plate, said plate having a linking plate secured across said slot at said peripheral portion to reinforce said plate across said slot.

24. The apparatus as recited in claim 21 wherein said hoist attachment comprises a main bar having an upper side and a lower side, and a pair of blocks secured to the lower side of said bar at opposite ends thereof, each block having an opening parallel to the length of the bar, said bar having at least one hoist member secured to the upper side of the bar, said hoist member adapted for lifting said bar, a guide pin extending through the opening in each said block, said guide pins having mounting blocks at the end of each guide pin, which limit the sliding movement of the guide pins within each opening, one said mounting block being adapted to mount a core mold plate and the other a cavity plate of each said mold module, such that when said mounting blocks are mounted to said plates, said plates may slide relative to the main bar, and said hoist bar may be lifted when said mounted mold plates are positioned in said open position.

25. The apparatus as recited in claim 24 wherein said at least one hoist member comprises a eye bolt secured to the upper side of the bar.

26. The apparatus as recited in claim 25 wherein one said eye bolt is positioned at the center of the bar.

27. The apparatus as recited in claim 25 wherein one said eye bolt is positioned at each opposite end of the bar.

28. The apparatus as recited in any one of claims 16 to 27 wherein said core plates may be secured to the cavity plate to form said mold module by safety straps secured between the periphery of each said core plate and cavity plate and said cavity plates are releasably secured to said manifold plates by removable straps and said core plates are releasably secured to said master core plates by clamp bar means.

29. The apparatus as recited in claims 16 to 28 wherein when said mold modules are positioned within said mold machine adjacent said respective master core plates, tightening means interconnected between a fixed portion on the mold machine and a position on the module may be operable to selectively pull in tight engagement said each said mold module to said mold machine.

30. The apparatus as recited in claim 29 wherein said tightening means comprises:

a hooked handle, attached onto the surface of a water manifold formed in the mold machine upon which the mold module rests when installed therein;

a pin installed on the mold core plate of the mold module, wherein when said module is positioned in the mold machine, resting on the water manifold, the handle being positionable between a release position where said handle does not engage said pin and a holding position where the handle engages said pin of the core plate, pulling the core plate tightly against the water manifold.

31. An apparatus for supporting mold plates within a mold machine, said apparatus comprising: a mold support member, said support member being positionable between an operable position whereat said support member interconnects by interconnection means said plates to a tie bar or guide way of the mold machine, allowing riding of said plate on said tie bar or guide way and an inoperable position whereat said interconnection means nests within a pocket in said plate.

32. An apparatus as recited in claim 31 wherein said interconnection means comprises support pins, and said mold plate includes a pocket shaped to accept said support pins which are moveable within said pocket between an *extended* position where they stick out towards said tie bars and hold the support member in the operable position, and a *retracted* position where they are nested in the pockets of the mold plates, in the inoperable position, said support pins being guided by bushings held in fixed position in mold plates, a stopper being used to

secure each support pin in one of the positions, and to prevent it from disengaging from the mold plate.

33. The apparatus as recited in claim 32 wherein said mold support apparatus includes, a bracket portion, a support pad and a locating key, the bracket portion being secured to the pin, the bracket portion being fastened to the support pad which has a surface shaped to rest onto the tie bars of the injection machine, said locating key locating the support pad in reference to the bracket portion.

34. The apparatus as recited in claim 33 wherein the support pad is made of a material with low coefficient of friction, in order to avoid scoring the tie bars of the injection machine.

35. The apparatus as recited in claim 33 wherein said support pin has multiple locations for the stopper, thus providing more than one operating position and said size variability.

36. The apparatus as recited in claim 33 which is adapted to ride on machine guide ways.

37. The apparatus as recited in claim 31 wherein the mold support member is permanently attached to one said mold plate, pivotable around a pivot point on said plate between said operable position and said inoperable position, when in said inoperable position said member is positioned within a pocket defined in said plate.

38. An apparatus for installing and tightening a mold module in a mold system, said module comprising a cavity plate, core plate secured to each other, said mold system comprising a master core plate, and water manifold said mold module being insertable into said mold system by positioning said module adjacent said

water manifold, and centering said module relative to said master core plate, at which point tightening means interconnected between a fixed portion of the mold system and a position on the module may be operable to selectively pull in tight engagement said mold module to said water manifold.

39. The apparatus as recited in claim 38 wherein said tightening means comprises a hooked handle, attached onto the surface of said water manifold, a pin installed onto the mold core plate of the mold module, wherein when said module is lowered into the injection machine, the handle positioned in a release position where said handle does not engage said pin, and when the mold core plate comes to a stop resting onto the water manifold, the handle is rotated to the holding position, wherein the hook handle engages said pin of the core plate, pulling the core plate firmly against the water manifold.

40. The apparatus as recited in claim 33 wherein said bracket portion may be adjustable in size to accommodate various spacings of said tie bars and guide ways.

41. The apparatus as recited in claim 28 wherein the clamp bar means includes at least one clamp bar securing the plates together with screwable fasteners, the at least one clamp bar including a pre loaded spring under the clamp which provides lift to open the clamp as the screwable fasteners are unscrewed.

42. The apparatus as recited in claim 41 wherein each said at least one clamp bar is secured using two spaced apart bolts.

43. The apparatus as recited in claim 42 wherein said master core plate utilizes between 4 and 6 said clamp bars.